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TITLE: Coating solution for paper comprises at least one constituent unit of a (meth)acrylic acid unit, an (meth) acrylic ester unit, and a constituent unit derived from at least one monomer of a compound of specific formula

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ABSTRACTED-PUB-NO: JP2002013096A

BASIC-ABSTRACT:

NOVELTY - A coating solution for paper uses a pigment and a binder as its basic constituents. A copolymer serving as a thickener is blended with the coating solution.

DETAILED DESCRIPTION - The copolymer consists of: (A) at least one constituent unit of an acrylic acid unit or a methacrylic acid unit; (B) at least one

constituent unit of an acrylic ester unit or a methacrylic ester unit; and (C)
a constituent unit derived from at least one monomer of a compound of formula
(I) or a compound of formula (II).

R1 = H or methyl;

R2 = divalent hydrocarbon or carbonyl;

R3 = 8-30C hydrocarbon;

m = 0 or 1;

n = 10-100.

USE - The coating solution is used for the paper and finds its application in
the coated paper.

ADVANTAGE - The coating solution has good water retention, and a low degree of
high share viscosity and viscosity under a blade, high rate coating, improved
gravure misdot, and improved inking. The coated paper has superior surface
smoothness, printability, picking resistance, and glossiness.

CHOSEN-DRAWING: Dwg.0/0

TITLE-TERMS: COATING SOLUTION PAPER COMPRISE ONE CONSTITUENT
UNIT METHO ACRYLIC
ACID UNIT METHO ACRYLIC ESTER UNIT CONSTITUENT UNIT
DERIVATIVE ONE
MONOMER COMPOUND SPECIFIC FORMULA

DERWENT-CLASS: A14 A82 F09 G02

CPI-CODES: A04-D; A04-F01A1; A12-B03A; F05-A06C; G02-A05C;

ENHANCED-POLYMER-INDEXING:

Polymer Index [1.1]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention relates to the coated paper which made new paper coating liquid and its paint film form in a paper base front face. If it says in more detail, it is related with the good coated paper of the ink impression nature which has the paint film of the paper coating liquid of the hyperviscosity with which lack of the water retention which prevents the fall of coating nature, especially the high-speed coating nature resulting from increase of the high share viscosity in the case of coating with a blade, and causes a surface-characteristic fall after coating is fully suppliable, and this paper coating liquid on a paper base front face.

[0002]

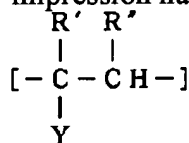
[Description of the Prior Art] Generally, in order to improve smooth nature, glossiness, and a printability to a print sheet, the spreading layer of coating liquid is prepared in the front face. After this coating liquid is prepared as a slurry which water was made to usually distribute by using white pigments, latexes, starches, etc., such as clay and whiting, as a binder and dilutes this to suitable concentration, a coater is supplied from an adjustment tank and it applies to the paper under transit continuously, and a part for an excess is removed with a coating head like a blade, it dries, and it is given to the paper base front face by making it the thickness of business. And the coating liquid removed from paper is returned to an adjustment tank, and a reuse is usually mixed and carried out to new coating liquid.

[0003] Thus, although it dries and a spreading layer is formed after being applied to a paper base front face as it is the above, coating liquid Although a printability falls as a result of producing the fall of smooth nature, and the ununiformity of thickness in order that the moisture of coating liquid may be absorbed by the paper base and components, such as clay, whiting, a latex, and starch, may permeate into a paper base, while resulting [from this spreading process] in a desiccation process It is known that the fall of such a surface characteristic originates mainly in lack of water retention.

[0004] By the way, although little addition of a high polymer like a carboxymethyl cellulose (CMC) or sodium alginate is carried out in order to adjust coating properties, such as the viscosity, a fluidity, and water retention, if it is going to control the fall of water retention and the amount of these high polymers is increased, the balance of high share viscosity and coating liquid viscosity will worsen, and a fluidity will usually fall to coating liquid. Consequently, it does not escape that surface characteristics, such as the picking-proof nature of the coated paper obtained, a printability, and smooth nature, fall when high-speed coating becomes impossible and productivity falls.

[0005] In order to conquer such a fault, the paper coating liquid which used the acrylic-acid-methacrylic-acid copolymer is proposed instead of a carboxymethyl cellulose or sodium alginate until now (JP,2-53996,A). Although this thing could raise water retention, viscosity, and a fluidity in the small amount compared with what used a carboxymethyl cellulose till then and sodium alginate, still sufficient water retention could not be acquired, and the fall of the above mentioned surface characteristic could not be controlled, and it may not necessarily be satisfied about viscosity, and that to

which high share viscosity was reduced more was desired. On the other hand, it is at least one sort and the (c) general formula [** 3] which the viscosity of coating liquid needed to be raised, and were chosen about the coating liquid for gravures from (a) methacrylic-acid unit, (b) acrylic ester unit, and the methacrylic ester unit instead of being said acrylic-acid-methacrylic-acid copolymer in order to improve impression nature.



A hydrogen atom or a methyl group, and Y R' in [type, and R " General formula-R-O(-A-O) n-X or -CONHx[-A-O(-A'-O) n-X] 2-x however, R -- hydrocarbon-group or carbonyl group, A, and A' of bivalence -- respectively -- the alkylene group of the shape of a straight chain of carbon numbers 2-4, and the letter of ramification -- A hydrogen atom, the hydrocarbon group of carbon numbers 1-7 or sulfonate residue, and n X The number of 1-100, The copolymer which consists of a configuration unit guided from at least one sort of monomers chosen from the compounds expressed with] is used as a thickener. x is 0 or 1 -- it was made to contain with a pigment and a binder -- an increase -- viscosity -- paper -- coating -- liquid -- and coated paper is proposed (JP,10-237797,A). However, although this thing could raise water retention, viscosity, and a fluidity compared with what used said acrylic-acid-methacrylic-acid copolymer, still sufficient water retention and a still sufficient fluidity could not be acquired, and the fall of the above mentioned surface characteristic or high-speed coating nature could not be controlled, and it may not necessarily be satisfied about viscosity, and what improved viscosity more was desired.

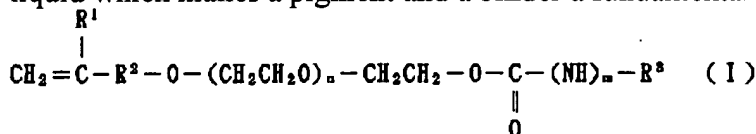
[0006]

[Problem(s) to be Solved by the Invention] While this invention improves the fault which conventional paper coating liquid has and prevents the fall of the lack of water retention, the high-speed coating nature by increase of high share viscosity, or the surface characteristic of coated paper The paper coating liquid which raised viscosity is offered, the coating liquid of a parenthesis is applied, gravure halftone dot lack is improved, and it is made for the purpose of offering the coated paper which moreover raised physical properties, such as surface smooth nature, a printability, picking-proof nature, and glossiness.

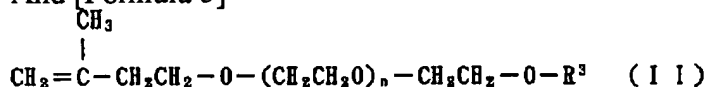
[0007]

[Means for Solving the Problem] this invention persons have good water retention, and high share viscosity under a blade is low at the time of coating. And the result of having repeated research wholeheartedly the paper coating liquid with which viscosity was raised being developed, By using as a thickener the copolymer which consists of an ester unit of at least one sort of acrylic acids, a methacrylic-acid unit and at least one sort of acrylic acids, or a methacrylic acid, and other specific units Based on a header and this knowledge, it came to complete this invention for the ability of that purpose to be attained.

[0008] That is, this invention is at least one sort of configuration units chosen as a thickener from at least one sort of configuration units chosen from (A) acrylic-acid unit and the methacrylic-acid unit, (B) acrylic ester unit, and the methacrylic ester unit, and the (C) general formula [** 4] to the paper coating liquid which makes a pigment and a binder a fundamental component.



And [Formula 5]



R1 in a formula -- a hydrogen atom or a methyl group, and R2 -- a bivalence hydrocarbon group or a carbonyl group -- R3 -- the hydrocarbon group of carbon numbers 8-30, and m -- 0 or 1, and n -- the integer of 10-100 -- it is -- the paper coating liquid characterized by blending the copolymer which consists of a configuration unit guided from at least one sort of monomers chosen from the compounds expressed -- And the coated paper which consists of a paper base which made the paint film of this paper coating liquid form in a front face is offered.

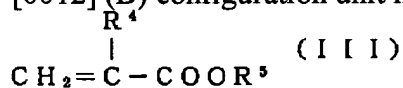
[0009]

[Embodiment of the Invention] Although this invention coating liquid contains a pigment and a binder as the fundamental component, although these components are used with conventional coating liquid, they can be chosen as arbitration from inside, and there is especially no limit. That is, as a pigment, clay, a calcium carbonate (whiting and precipitated calcium carbonate are included), a kaolin, talc, titanium oxide, a silica, a zinc oxide, an aluminum hydroxide, clay, a lake, a synthetic plastics pigment, etc. are used, for example. These may be used independently and may be used combining two or more sorts. The loadings are usually chosen in the range of 40 - 70 mass % based on the coating liquid whole quantity.

[0010] Moreover, as a binder, a latex or a solution of the composition commonly used by paper coating liquid conventionally or naturally-occurring polymers etc. is used. As such a polymeric material, there are a styrene-butadiene system copolymer, a styrene-acrylic copolymer, a vinyl acetate-acrylic copolymer, an ethylene-vinyl acetate system copolymer, a butadiene-methyl methacrylate system copolymer, a vinyl acetate-butyl acrylate system copolymer, a styrene-maleic-anhydride system copolymer, an isobutene-maleic-anhydride system copolymer, an acrylic-acid-methyl methacrylate system copolymer, an oxidized starch, esterification starch, etherification starch, enzyme denaturation starch, casein, soybean protein, etc., for example. These may be used independently and may be used combining two or more sorts. the loadings -- per pigment 100 mass section -- usually -- 3 - 30 mass section -- it is preferably chosen in the range of 5 - 20 mass section.

[0011] Next, at least one sort of configuration units chosen from (A) acrylic-acid unit and the methacrylic-acid unit as a thickener in this invention coating liquid, (B) It is required to use the copolymer which consists of at least one sort of configuration units chosen from the compounds expressed with at least one sort of configuration units chosen from acrylic ester and a methacrylic ester unit, the (C) aforementioned general formula (I), and (II).

[0012] (B) configuration unit in this copolymer is a general formula [** 6].



It is the unit guided from the monomer expressed with (a hydrogen atom or a methyl group, and R5 are an alkyl group or a cycloalkyl radical as for R4 in a formula).

[0013] As an alkyl group shown by these R5, a methyl group, an ethyl group, a propyl group, butyl, an octyl radical, a 2-ethylhexyl radical, the dodecyl, a hexadecyl radical, an octadecyl radical, etc. are mentioned, and a cyclopentyl group, a cyclohexyl radical, etc. are mentioned as a cycloalkyl radical, for example.

[0014] As an example of such a monomer, a methyl acrylate, an ethyl acrylate, acrylic-acid propyl, butyl acrylate, acrylic-acid octyl, 2-ethylhexyl acrylate, acrylic-acid cyclohexyl, acrylic-acid dodecyl, acrylic-acid hexadecyl, acrylic-acid octadecyl, corresponding methacrylic ester, etc. can be mentioned.

[0015] Next, as a (C) configuration unit, the compound expressed with a general formula (I) or (II) is used. The inside R2 of this general formula is the hydrocarbon group or carbonyl group (= CO) of bivalence, and, in the case of the former, in the case of an ether mold and the latter, serves as an ester mold. As an example in case these R2 is the hydrocarbon group of bivalence, there are the alkylene group of the shape of the shape of a straight chain of carbon numbers 1-25 and branching, the cyclo alkylene group of carbon numbers 5-25, the arylene radical of carbon numbers 6-25, an alkylation

arylene radical, for example, a butyl phenylene group, an octyl phenylene group, a nonyl phenylene group, a DESHIRU phenylene group, a dodecyl phenylene group, etc. When a ring is included in these hydrocarbon groups, these may have the inactive substituent and there is especially no limit about the joint location of these substituents. Moreover, as an alkylene group, for example, there are ethylene, a propylene radical, a trimethylene radical, a butylene radical, etc., and ethylene, a propylene radical, especially ethylene are desirable in this.

[0016] Furthermore, as a hydrocarbon group shown by R3, which hydrocarbon group of aliphatic series, alicyclic, and aromatic series is sufficient, and the alkyl group of the shape of the thing of carbon numbers 8-30, for example, the shape of a straight chain of carbon numbers 8-18, and branching, the cycloalkyl radical of carbon numbers 8-30, a phenyl group, etc. are mentioned. As an example of an alkyl group, an octyl radical, a 2-ethylhexyl radical, the dodecyl, a hexadecyl radical, an octadecyl radical, etc. are mentioned. The range of the desirable carbon number of R3 is 8-18.

[0017] Next, it is the number of 20-50 preferably, and n in a general formula (I) and (II) is the number of 10-100, and a thing this is indicated to be as the number of averages.

[0018] In the copolymer used as a thickener with this invention coating liquid, the content rates of (A) configuration unit and (B) configuration unit are 5:95 thru/or 70:30 in a mass ratio, and what has the content rate of (C) configuration unit in the range of 0.1 - 50 mass % based on copolymer mass is desirable.

(A) If there are few rates of a configuration unit than this, the water retention effectiveness will become inadequate, and a copolymer becomes unstable while B mold viscosity will rise extremely, if it increases more than this. When the fluidity under a high share and the field of the water retention effectiveness are taken into consideration, the mass ratio of (A) configuration unit and (B) configuration unit has the desirable range of 10:90 thru/or 60:40.

[0019] moreover, (C) configuration unit -- comparatively, if it becomes under 0.1 mass % based on copolymer mass, sufficient viscous improvement will not be obtained, if 50 mass % is exceeded, viscosity will become high too much and a fluidity will fall. The field of viscous and fluid balance to this rate has the desirable range of 1 - 30 mass %.

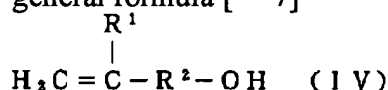
[0020] In the coating liquid of this invention, water retention, the fluidity under a high share, and viscosity are improving by having used the above-mentioned specific thickener. This water retention can be measured by using the pressurization dehydrating method. In this case, retention meter AA-GWR [the product made from cull tech scientific (Kaltec Scientific)] etc. is used, and the amount of dehydration to the filter paper of a coating color is measured on temperature the conditions of 20 degrees C for coating color 10ml, the pressure of 1.5 bars, and pressurization time amount 15 seconds. It is shown that water retention is so good that the measured value is small, as a standard with good water retention, it is desirable for measured value to be two or less 50 g/m, and it is still more desirable to consider as two or less 40 g/m especially from the improvement in a coated paper property and the field of high-speed coating nature.

[0021] Moreover, a high share viscometer is used for the fluidity of the coating liquid under a high share, it is rotational frequency 8800rpm, and can be evaluated by measuring the high share viscosity in 20 degrees C. And as for this value, in the case of the coated paper for gravures, it is desirable to make it into 30cps or less in the case of 40cps or less and the coated paper for offset printing.

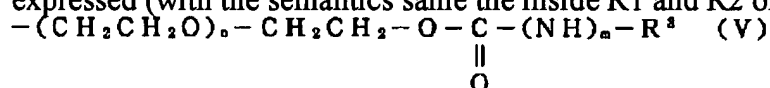
[0022] On the other hand, viscosity can be evaluated by measuring B mold viscosity of coating liquid. For example, TAPPI criteria T648 When B mold viscosity in 20 degrees C is measured by rotational frequency 60rpm according to Su-72, it is desirable to set B mold viscosity to 1000cps or more. Moreover, in order to raise ink impression nature as coated paper for gravures, it is desirable to set B mold viscosity to 2000cps or more.

[0023] As for the copolymer used as a thickener of this invention coating liquid, it is desirable for the mass average molecular weight of the polystyrene conversion measured by the gel-permeation-chromatography method (the GPC method) to be in the range of 900,000-8,000,000. Water retention sufficient in the thing of low molecular weight is not acquired rather than this, and the viscosity of coating liquid becomes high and it is hard coming to deal with it by the thing of the amount of

macromolecules rather than this. The mass average molecular weight of especially a desirable thing is the thing of the range of 1,000,000-4,000,000 in respect of the balance of water retention and viscosity. [0024] The copolymer used as a thickener of this invention coating liquid can be easily manufactured by the approach commonly used by manufacture of the usual acrylic copolymer. For example, it can manufacture by carrying out copolymerization of at least one sort of monomers chosen from the acrylic acid and the methacrylic acid, at least one sort of monomers chosen from acrylic ester and methacrylic ester, and at least one sort of monomers chosen from the compounds expressed with said general formula (I) or (II). Moreover, at least one sort of monomers chosen from the acrylic acid and the methacrylic acid, at least one sort of monomers chosen from acrylic ester and methacrylic ester, and a general formula [** 7]



It is the general formula [** 8] after carrying out copolymerization of at least one sort of monomers expressed (with the semantics same the inside R1 and R2 of a formula as the above).



At least one sort of monomers which R3, n, and m in a formula introduced the radical expressed (with the same semantics as the above), or were chosen from the acrylic acid and the methacrylic acid, General formula-(CH₂CH₂O)_n-CH₂CH₂-O-R₃ after carrying out copolymerization of at least one sort of monomers chosen from acrylic ester and methacrylic ester, and the 3-methyl-3-butene-1-ol (VI) R3 and n in a formula can be manufactured also by introducing the radical expressed (with the same semantics as the above).

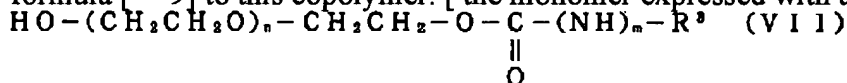
[0025] Especially a limit does not have the polymerization method of these monomers, and the approaches of arbitration, such as a solution polymerization method, an emulsion-polymerization method, and a solid-state-polymerization method, can be used for it. Under the present circumstances, as a polymerization initiator to be used, the combination of water-soluble azo compound, peroxide, 2 [for example,], and 2-azobis (2-amidinopropane) HCl hydrochloride, a hydrogen peroxide, a water-soluble inorganic peroxide, or a water-soluble inorganic peroxide and organic peroxide etc. is used. [a water-soluble reducing agent, and] Potassium persulfate, ammonium persulfate, etc. are mentioned as an example of this water-soluble inorganic peroxide. A complex compound, a sulfinic acid or its sodium salt with heavy metal, such as the reducing agent used for water as a meltable usual radical oxidation reduction polymerization catalyst component as an example of this water-soluble reducing agent, for example, ethylenediaminetetraacetic acid, its sodium salt, potassium salt or these and iron, copper, and chromium, potassium salt, L ascorbic acid or its sodium salt, potassium salt and calcium salt, the first iron of a pyrophosphoric acid, a ferrous sulfate, ferrous ammonium sulfate, a sodium sulfate, sodium hydrogen sulfite, formaldehyde sodium sulfoxylide, and reducing sugars are mentioned. On the other hand, as water-soluble organic peroxide, hydroperoxides, such as cumene hydroperoxide, p-cymene hydroperoxide, a tert-butyl isopropylbenzene hydroperoxide, a diisopropylbenzene hydroperoxide, p-menthonaphthene hydroperoxide, decalin hydroxy oxide, a tert-aluminum hydroperoxide, a tert-butyl hydroperoxide, and an isopropyl hydroperoxide, are mentioned, for example.

[0026] Moreover, as an emulsifier in an emulsion polymerization, the combination of an anionic surfactant, or the it and the Nonion nature surfactant is usually used. As this anionic surfactant or an Nonion nature surfactant, although usually used for an emulsion polymerization, it can choose and use for arbitration from inside. As an example of such an anionic surface active agent, alkylbenzene sulfonates, an alkyl sulfonate, an alkyl-sulfuric-acid ester salt, a fatty-acid metal salt, a polyoxy alkyl ether sulfate salt, a polyoxyethylene-alkyl-phenyl-ether sulfate salt, a succinic-acid dialkyl ester sulfonate, etc. can be mentioned. As an example of the Nonion nature surface active agent, moreover, polyoxyethylene alkyl phenyl ether, Polyoxyethylene alkyl ether, polyoxyethylene fatty acid ester,

Polyoxyethylene sorbitan fatty acid ester, the polyoxyethylene-alkyl-ether glycerol ester of boric acid, It has a polyoxyethylenes chain, such as polyoxyethylene-alkyl-ether phosphoric ester, in a molecule. The polyoxyethylene chain of the compound which has surface activity ability, and said compound can mention oxyethylene, the compound permuted with the copolymer of oxypropylene, a sorbitan fatty acid ester, a glycerine fatty acid ester, pentaerythritol fatty acid ester, etc.

[0027] It is under [aquosity medium / which contains a polymerization initiator and an emulsifier according to this emulsion-polymerization method] setting. The ester and the monomer which reaches and is expressed with a general formula (I) or (II) of at least one sort of acrylic acids or a methacrylic acid, at least one sort of acrylic acids, or a methacrylic acid are mixed at a predetermined rate. Usually, by carrying out a polymerization in the temperature of the range of 30-80 degrees C, a desired copolymer particle can obtain the emulsion distributed to homogeneity. The emulsion obtained by this approach can also be used for preparation of paper coating liquid as it is, as long as it is a request, it may take out a copolymer as a solid by the salting-out or spray drying, and paper coating liquid may be prepared and used for it using this.

[0028] Moreover, it sets to the approach of introducing the radical expressed with a general formula (V) or (VI), after carrying out copolymerization of the monomer expressed with a general formula (IV) instead of, for example, 3-methyl-3-butene-1-ol, and making a basic copolymer form, and is a general formula [** 9] to this copolymer. [the monomer expressed with a general formula (I) or (II)]



or -- HO-(CH₂CH₂O)_n-CH₂CH₂-O-R₃ (VIII)

R₃, n, and m in a formula can be manufactured by making the polyoxyalkylene compound blockaded by the radical which the free end of a compound expressed (with the same semantics as the above) can permute by the hydroxyl group react. As a polyoxyalkylene compound expressed with a general formula (VII) For example, polyoxyethylene mono-nonoic acid ester, polyoxyethylene mono-decanoic-acid ester, Polyoxyethylene mono-dodecanoic acid ester, polyoxyethylene mono-octadecanoic acid ester, The urethane compound obtained from a polyoxyethylene and nonyl isocyanate, The urethane compound obtained from a polyoxyethylene, the urethane compound and polyoxyethylene which are obtained from DESHIRU isocyanate, the urethane compound and polyoxyethylene which are obtained from dodecyl isocyanate, and octadecyl isocyanate is mentioned. Moreover, as a compound expressed with a general formula (VIII), the polyoxyethylene nonyl ether, the polyoxyethylene DESHIRU ether, polyoxyethylene dodecylether, the polyoxyethylene octadecyl ether, polyoxyethylene butyl phenyl ether, polyoxyethylene octyl phenyl ether, polyoxyethylene DESHIRU phenyl ether, the polyoxyethylene nonylphenyl ether, polyoxyethylene dodecyl phenyl ether, etc. are mentioned, for example. These monomers may be used independently and may be used combining two or more sorts.

[0029] These compounds can also be made to react in the form changed into the side chain of a basic copolymer, and the derivative which is easy to react, for example, the form of a halogenide or alkali salt. This reaction can be performed by the well-known approach usually used for introducing polyoxyalkylene chain into a compound.

[0030] Next, in this invention coating liquid, it is desirable to blend a thickener based on the solid content at a rate of per pigment 100 mass section and the 0.01 - 0.5 mass section. If coating liquid with which this amount serves as water retention sufficient in under the 0.01 mass section and low high share viscosity is not obtained and the 0.5 mass sections are exceeded, the viscosity of coating liquid will become high too much, and gelation will be caused. The desirable loadings of fields, such as water retention and the viscosity of coating liquid, and a fluidity, to this compound are the range per pigment 100 mass section and of the 0.05 - 0.3 mass section.

[0031] This invention coating liquid can be made to contain suitably a dispersant, other thickeners, a defoaming agent, a deck-watertight-luminaire-ized agent, a coloring agent, etc. in the range in which the purpose of this invention is not spoiled if needed. As this dispersant, the sodium salt of sodium polyacrylate, hexametaphosphoric acid sodium, a sodium pyrophosphate, and an acrylic-acid-maleic-

acid system copolymer etc. is mentioned, for example.

[0032] This invention coated paper prepares the spreading layer of said paper coating liquid in a paper base front face so that solid content coating weight may serve as 2 - 30 g/m², and as a paper base, paper of fine quality, a report grade paper, the paper board, etc. are mentioned, for example. Moreover, a spreading layer can be formed by carrying out coating of said paper coating liquid, and carrying out desiccation processing by the usual method of using a blade coating machine, a roll coater, an air knife coating machine, etc. for one side or both sides of these paper bases.

[0033]

[Example] Next, an example explains this invention to a detail further.

[0034] In addition, the physical properties of the paper coating liquid in each example and coated paper were searched for according to the following approach.

- (1) Water retention of paper coating liquid; according to the pressurization dehydrating method, retention meter AA-GWR [the product made from cull tech scientific (Kaltex Scientific)] was used, and the amount of dehydration to the filter paper of a coating color was measured on temperature the conditions of 20 degrees C for coating color 10cc, the pressure of 1.5 bars, and pressurization time amount 15 seconds. It is shown that water retention is so good that a numeric value is small.
- (2) High share (HS) viscosity of paper coating liquid (cps); the high share viscometer [the NIPPON SEIKI CO., LTD. make] was used, and the high share viscosity in 20 degrees C was measured by rotational frequency 8800rpm.
- (3) B mold viscosity of paper coating liquid (cps); TAPPI criteria T648 According to Su-72, B mold viscosity in 20 degrees C was measured by rotational frequency 60rpm.
- (4) Glossiness of coated paper; JIS It measured according to P8142-1965.
- (5) The whiteness degree of coated paper; JIS It measured according to P8123-1961.
- (6) Smoothness of coated paper; JIS It measured according to P8119-1976.
- (7) It printed on the surface of coated paper using the dry pick of coated paper, and the wet pick; RI printing machine (product made from *****), the picking generating situation was observed, and law (so good that a numeric value is large) estimated five points.
- (8) The ink set of coated paper; it printed at intervals of set rate 20 seconds on the surface of coated paper using RI printing machine (product made from *****), the concentration of the ink then transferred was observed, and law (so good that a numeric value is large) estimated five points.
- (9) Gravure halftone dot lack of coated paper; it measured using the Printing Bureau type gravure fitness testing machine (the Kumagaya Riki Kogyo make, serial number 8608189).

[0035] the example 1 clay 70 mass section, the whiting 30 mass section, the alkali thickening mold styrene-butadiene copolymer latex 6 mass section (as solid content), and a dispersant (the SOMAR Corp. make --) After adding water so that the solvent deasphalting-40K 0.1 mass section may be mixed (as solid content) and the whole solid content concentration may become 62 mass %, The mass average molecular weight 2 which consists of methacrylic-acid unit 40 mass %, ethyl-acrylate unit 52.6 mass %, and urethane bond object 7.4 mass [of the octadecyl polyoxyethylene (3-methyl-3-butenyl) ether] %, the methacrylic-acid-ethyl-acrylate-octadecyl polyoxyethylene (3-methyl-3-butenyl) ether copolymer emulsion (solid content 30 mass % --) of 000 and 000 Gravure form coating liquid was prepared by adding the 0.2 mass sections based on a copolymer (as solid content), and mixing 20-degree-C viscosity 50 mPa-s and the mean particle diameter of 65nm to homogeneity. The physical properties of this thing are shown in Table 1. In addition, a mass mean molecular weight is the value of the polystyrene conversion measured by the GPC method. Next, spreading desiccation of this paper coating liquid was carried out so that solid content coating weight might become 15 g/m² on one side of paper of fine quality (basis-weight 60 g/m²), and coated paper was created. Aforementioned [of this coated paper]

(1) - (6) and the physical properties of (9) are shown in Table 1.

[0036] In example 2 example 1, it replaced with the ester connective of the octadecyl polyoxyethylene (3-methyl-3-butenyl) ether, and except [all] having considered as the urethane bond object of the dodecyl polyoxyethylene (3-methyl-3-butenyl) ether, paper coating liquid was prepared like the example 1, and coated paper was further created using this. The physical properties of paper coating liquid and

coated paper are shown in Table 1, respectively.

[0037] In example 3 example 1, except [all] having used the monomer component which consists of the methacrylic-acid 40 mass section, the methyl-acrylate 52.9 mass section, and the urethane bond object 7.1 mass section of the dodecyl polyoxyethylene (3-methyl-3-butenyl) ether as a monomer component, paper coating liquid was prepared like the example 1, and coated paper was further created using this. The physical properties of paper coating liquid and coated paper are shown in Table 1, respectively.

[0038] In example of comparison 1 example 1, except [all] having used the monomer component which consists of the methacrylic-acid 40 mass section, the ethyl-acrylate 53.1 mass section, and the urethane bond object 6.9 mass section of the hexyl polyoxyethylene (3-methyl-3-butenyl) ether as a monomer component, paper coating liquid was prepared like the example 1, and coated paper was further created using this. The physical properties of paper coating liquid and coated paper are shown in Table 1, respectively.

[0039] In example of comparison 2 example 1, except [all] having used the monomer component which consists of the methacrylic-acid 40 mass section, the ethyl-acrylate 53.5 mass section, and the 50 mol addition product 6.5 mass section of ethyleneoxy radicals of the polyoxyethylene (3-methyl-3-butenyl) ether as a monomer component, paper coating liquid was prepared like the example 1, and coated paper was further created using this. The physical properties of paper coating liquid and coated paper are shown in Table 1, respectively.

[0040]

[Table 1]

		実 施 例			比 較 例	
		1	2	3	1	2
塗工液 物 性	保水性 (g/m ²)	37	40	38	42	42
	H S 粘度 (c p s)	22	23	23	24	24
	B 型粘度 (c p s)	3200	2600	2800	2400	2400
塗工紙 物 性	光沢度	78	76	76	76	75
	白色度	80	80	80	80	80
	平滑性 (秒)	1450	1350	1400	1300	1300
	グラビア網	20% 網点	12	18	16	24
	点欠落数	10% 網点	28	38	32	43

[0041] The example 4 clay 80 mass section, the whiting 20 mass section, the styrene-butadiene copolymer latex 10 mass section (as solid content), The oxidized starch 3 mass section and the dispersant (SOMAR Corp. make, solvent deasphalting-40K) 0.3 mass section are blended (as solid content). After adding water so that the whole solid content concentration may become 64 mass %, based on the copolymer, the 0.2 mass section was added (as solid content), the same copolymer emulsion as what was used in the example 1 into it was mixed to homogeneity, and offset paper coating liquid was prepared. The physical properties of this thing are shown in Table 2. In addition, a mass mean molecular weight is the value of the polystyrene conversion measured by the GPC method. Next, spreading desiccation of this paper coating liquid was carried out so that solid content coating weight might become 15 g/m² on one side of paper of fine quality (basis-weight 60 g/m²), and coated paper was created. The physical properties of aforementioned [of this coated paper] (1) - (8) are shown in Table 2.

[0042] In example of comparison 3 example 2, except having used the copolymer emulsion same as a copolymer emulsion as what was used in the example 1 of a comparison, paper coating liquid was prepared like the example 2, and coated paper was created using this. The physical properties of paper coating liquid and coated paper are shown in Table 2, respectively.

[0043]

[Table 2]

		実施例 4	比較例 3
塗工液 物 性	保水性 (g/m ²)	36	42
	H S 粘度 (c p s)	25	28
	B 型粘度 (c p s)	2500	1800
塗工紙 物 性	光沢度	79	77
	白色度	82	82
	平滑性 (秒)	1300	1250
印 刷 適 性	ドライピック	4	3
	ウェットピック	3	3
	インクセット	4	3

[0044]

[Effect of the Invention] It has the low high share viscosity under good water retention and a blade, and viscosity, high-speed coating nature, gravure halftone dot lack, and ink impression nature are improved, and the paper coating liquid of this invention can give the coated paper which was moreover excellent in surface smooth nature, a printability, picking-proof nature, glossiness, etc.

[Translation done.]